

# Salinity in the Central Valley

Salinity Stakeholder Workshop  
April 17, 2008

Elaine Archibald  
California Urban Water Agencies

# Presentation Overview

- What is salinity?
- What is the problem?
- Why is salinity increasing?
- Who is affected and who contributes to the problem?
- What does the future hold?
- What are the potential solutions?

# What is Salinity?

- Measured as Total Dissolved Solids or Electrical Conductivity
- Ions Dissolved in Water
  - Calcium, Magnesium, Sodium, Potassium, Bicarbonate, Sulfate, Chloride, Nitrate, Bromide



# What is the Problem?

- Salt is accumulating in Central Valley soils.
- Salinity is increasing in Central Valley surface waters.
- Salinity is increasing in groundwaters of the Central Valley.

# Why is Salinity Increasing?

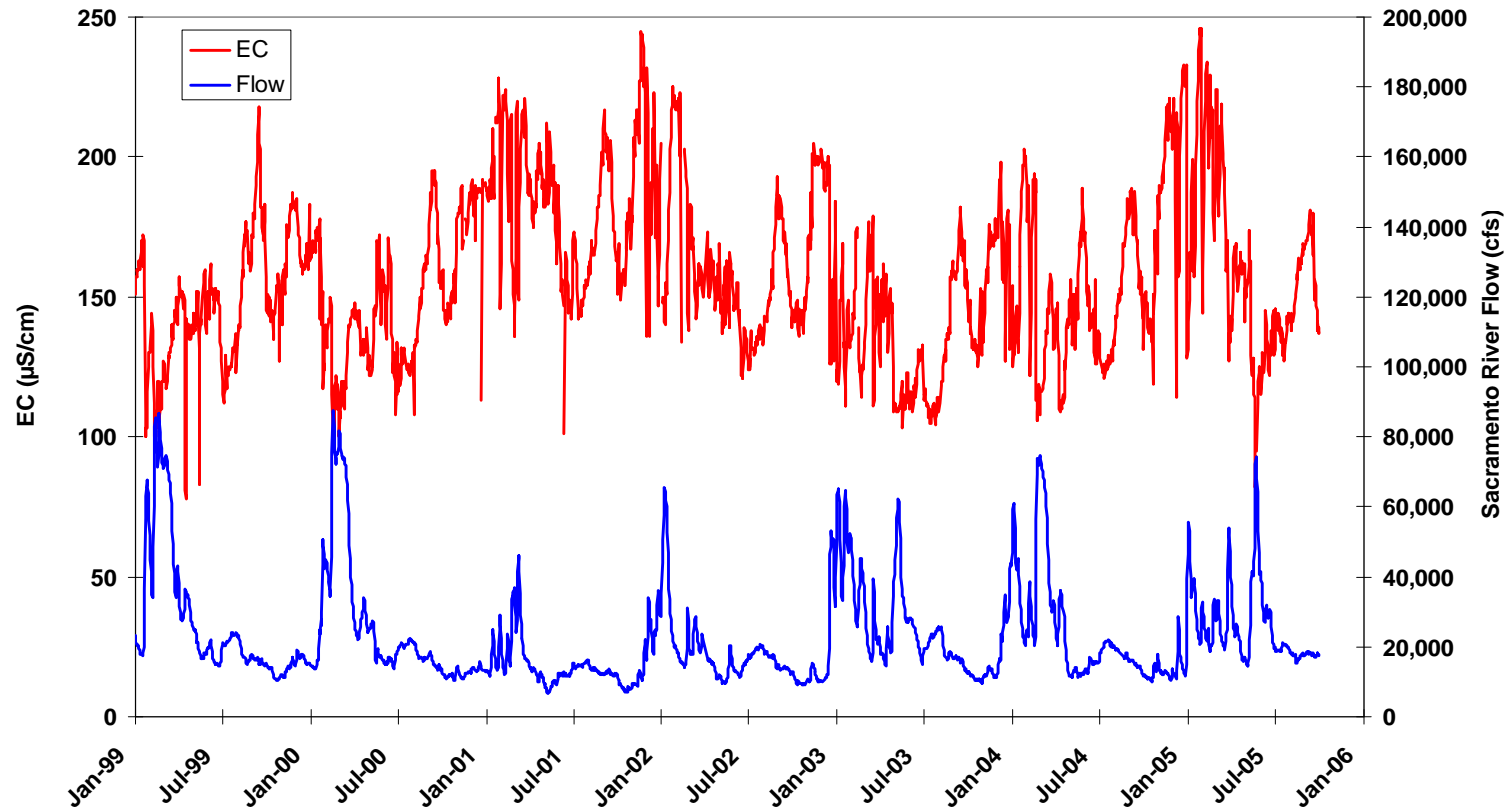
- Sacramento Basin
- San Joaquin Basin
- Tulare Basin

# Sacramento Basin

- Large volumes of low salinity surface waters
- Salinity increases from upstream to downstream due to water diversions, consumptive use, and discharges.
- Salt flows out of the Sacramento Basin.



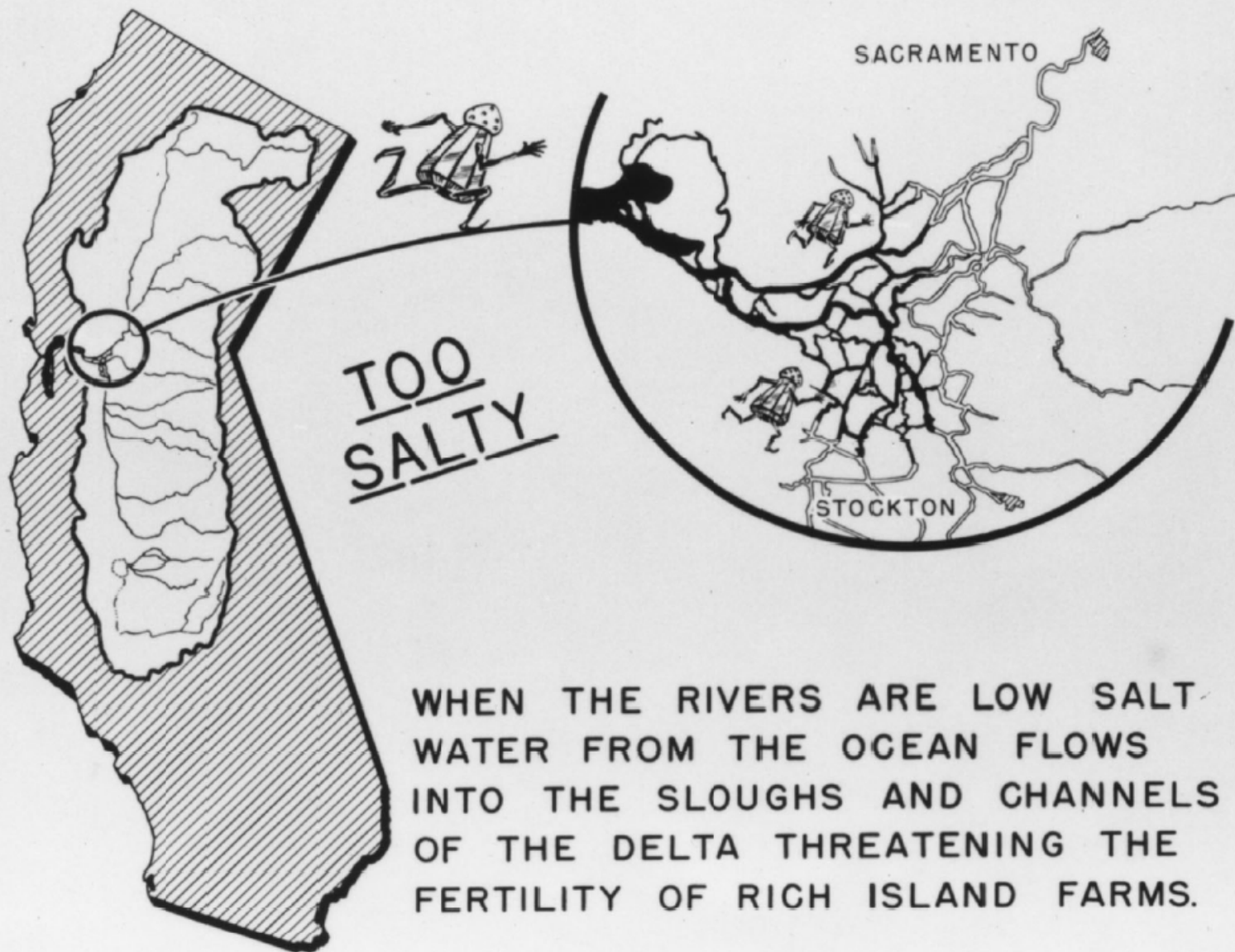
# EC and Flow in the Sacramento River



# San Joaquin Basin

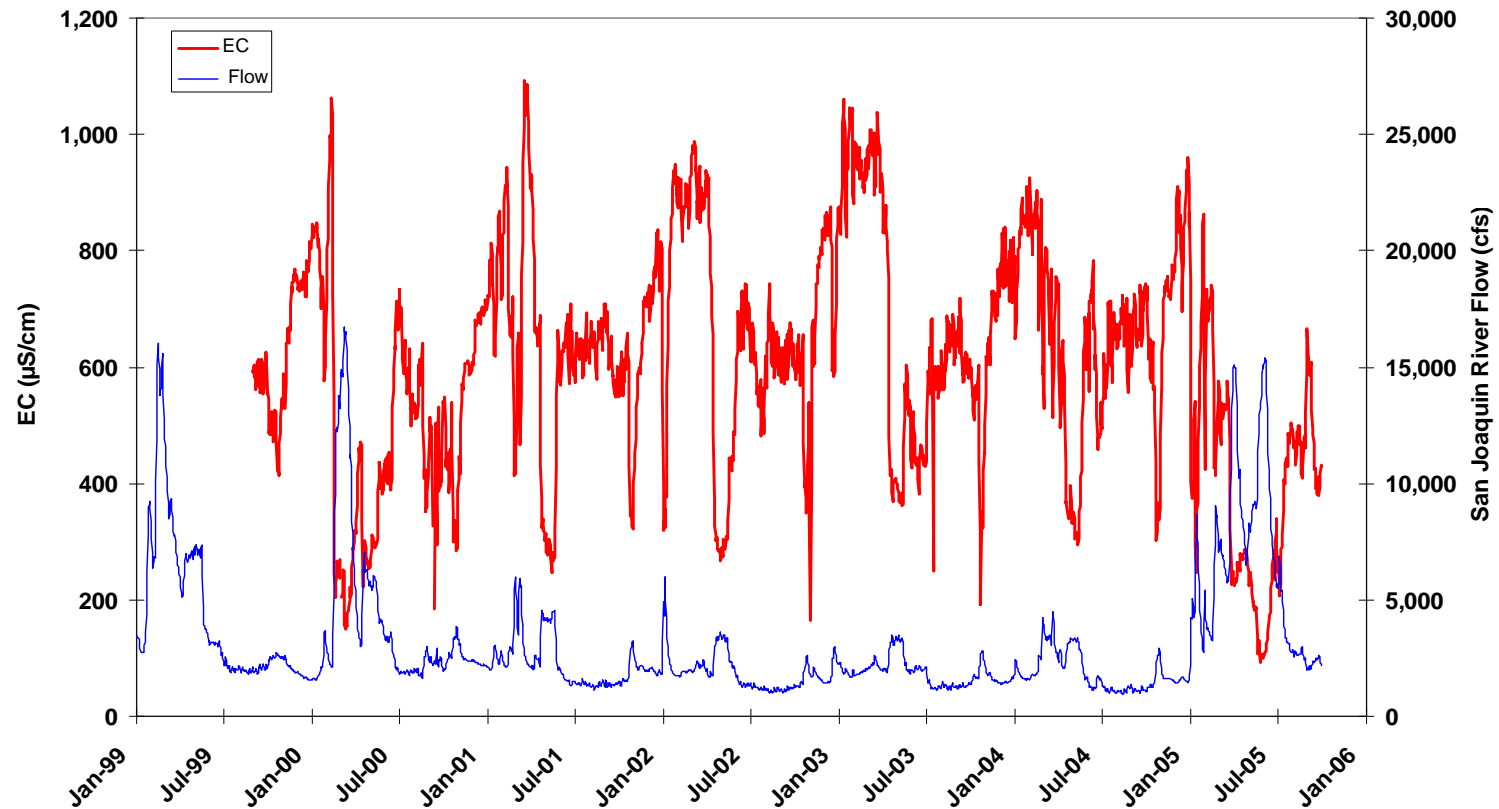
- Low salinity surface waters are diverted out of the Basin
  - Tuolumne River and Mokelumne River diversions to the Bay Area
  - Upper San Joaquin River to the Tulare Basin
- High salinity surface waters from the Delta are imported into the Basin.
- Substantial amounts of salt are recirculated from the San Joaquin Basin to the Delta and back to the Basin.





WHEN THE RIVERS ARE LOW SALT  
WATER FROM THE OCEAN FLOWS  
INTO THE SLOUGHS AND CHANNELS  
OF THE DELTA THREATENING THE  
FERTILITY OF RICH ISLAND FARMS.

# EC and Flow in the San Joaquin River



# Tulare Basin

- High salinity surface waters from the Delta are imported into the basin.
- Essentially closed basin – most salt remains in the basin.





# Who is Affected and Who Contributes to the Problem?

- Individuals
- Drinking Water and Wastewater Agencies
- Industry
- Agriculture
- Confined Animal Feeding Operations
- Wetlands

# Individuals

- Effects
  - Objectionable taste in drinking water
  - Bottled water or home treatment devices purchased
  - Health impacts – sodium and nitrate
  - Corrosion of pipes and appliances
- Salt Contributions
  - Water consumption
  - Water softeners and garbage disposals
  - Fertilizers and soil amendments
  - Personal care and cleaning products



# Drinking Water and Wastewater Agencies

- Effects
  - More advanced treatment
  - Limits ability to recycle wastewater and recharge groundwater
  - More stringent discharge requirements for wastewater dischargers
- Salt Contributions
  - TDS increases by about 300 to 500 mg/L between source water and wastewater



# Industry

- Effects
  - Increased pretreatment
  - More stringent discharge requirements
- Salt Contributions
  - Discharges to surface waters and groundwaters

# Agriculture

- Effects
  - Limits crop production
  - Salt tolerant crops
  - Land fallowing
- Salt Contributions
  - Crops use water and leave salts behind
  - Fertilizers and soil amendments
  - Drainage contains more salt than irrigation water



# Confined Animal Feeding Operations

- Effects

- Increased salinity affects cropping patterns, which affects ability of CAFOs to apply manure to land.

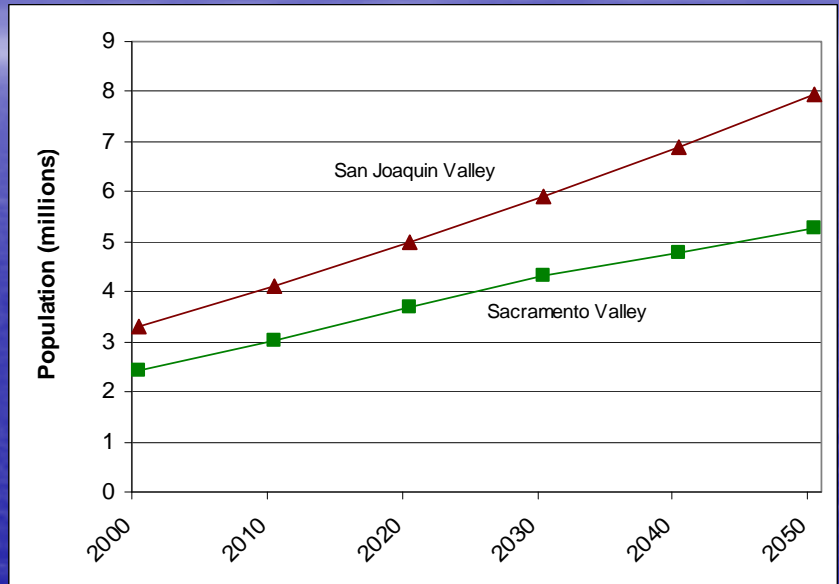
- Salt Contributions

- Salts in feed are transferred to manure resulting in discharges to groundwater and surface waters.



# What Does the Future Hold?

- MORE SALT
- Population Growth
  - More water diversions
  - More discharges
- Climate Change
  - Seawater intrusion
  - Less snow and more rain = more difficulty capturing high quality water for later use



# What are the Potential Solutions?

- Short-term
  - Actions to improve water quality in the Delta – primarily barriers
  - Management practices
- Long-term
  - Peripheral canal or other conveyance to improve quality of water pumped from Delta
  - Drain or brine line to the ocean
  - In-Valley solution????



# Summary

- Large amounts of salt are imported into the San Joaquin and Tulare Basins.
- Consumptive use of water increases salinity.
- It is imperative that we develop a salt management plan and address this problem.
- We (people, urban, agriculture, industry) are all part of the problem and we must work together to address salinity in the Central Valley.



# Progress Will Be Slow But We Don't Have a "No Action" Alternative

